

# RELATIONSHIP OF MOVEMENT SCREENS WITH PAST SHOULDER OR ELBOW SURGERIES IN COLLEGIATE BASEBALL PLAYERS

Andrew M Busch, EdD<sup>1</sup>

Daniel R Clifton, PhD, ATC<sup>2</sup>

James A Onate, PhD, ATC<sup>2,3</sup>

## ABSTRACT

**Background:** Upper extremity injuries commonly occur in baseball players, and can often necessitate surgical interventions. Athletes recovering from previous surgeries may be at greater risk of a secondary injury due to potential residual deficits in global movement. Identifying individuals with residual movement dysfunction following surgery during a pre-participation examination may help health care professionals identify baseball players who may be at a greater risk of re-injury in their throwing arms so that appropriate interventions can be developed.

**Purpose:** The purpose of this study was to assess relationships between history of shoulder or elbow surgeries and Functional Movement Screen™ (FMS™) shoulder mobility scores or Selective Functional Movement Assessment (SFMA) upper extremity patterns in collegiate baseball players.

**Study Design:** Cohort study.

**Methods:** One hundred seventy-six healthy, male, Division III collegiate baseball players (mean age =  $19.65 \pm 1.52$  years) underwent preseason screening using the FMS™ shoulder mobility screen, and SFMA upper extremity patterns. Total FMS™ scores were dichotomized into “good” and “poor” groups (good = 2 or 3, poor = 0 or 1). SFMA scores were dichotomized into “good” and “poor” groups (good = functional non-painful (FN), poor = dysfunctional painful (DP), dysfunctional non-painful (DN), and functional painful (FP). Dichotomized FMS™ and SFMA scores were compared to questionnaire data regarding history of shoulder or elbow surgeries.

**Results:** Thirty participants (17%) reported a previous shoulder or elbow surgery in their dominant arms. Past surgeries in the shoulder or elbow were not related to FMS™ (odds ratio [OR]=0.74, 95% confidence interval [CI]=0.30, 1.82),  $p=0.52$ ) or SFMA performance (OR=0.93, 95% CI=0.38, 2.27,  $p=0.88$ ) independent of grade and playing position.

**Conclusion:** History of shoulder or elbow surgery was not related to performance on the FMS™ shoulder mobility test or SFMA upper extremity patterns. Differences in the dates of surgery at the time of testing, and sport-specific adaptations of the upper extremities that are common in baseball players due to the cumulative tissue stress from years of throwing at the collegiate level, may explain these insignificant findings.

**Level of Evidence:** Level 3

**Keywords:** Baseball, Functional Movement Screen™, elbow surgery, movement system, Selective Functional Movement Assessment, shoulder surgery

<sup>1</sup> Department of Health and Human Kinetics, Ohio Wesleyan University, Delaware, OH

<sup>2</sup> School of Health and Rehabilitation Sciences, The Ohio State University, Columbus, OH

<sup>3</sup> Jameson Crane Sports Medicine Institute, The Ohio State University Wexner Medical Center, The Ohio State University, Columbus, Ohio, USA

## Acknowledgements

The authors would like to thank the four universities for their help in allowing access to their players.

Conflict of Interest and Source of Funding: There are no conflicts of interest to report and no funding was received for this study.

## CORRESPONDING AUTHOR

Andrew Busch

Department of Health and Human Kinetics  
Ohio Wesleyan University, Edwards  
Gymnasium

Delaware, OH 43015

614-783-6917

E-mail: [ambusch@owu.edu](mailto:ambusch@owu.edu)

---

## INTRODUCTION

Upper extremity injuries are a common occurrence in baseball players at almost all levels of competition, as the repetitive throwing motion produces large forces in the soft tissues of the shoulder and elbow.<sup>1,2,3,4</sup> Such overuse injuries often require surgical interventions. Pitching is the primary position to experience upper extremity injuries that result in greater time loss and surgical interventions when compared to other position players.<sup>5</sup> Of injuries requiring surgery, the elbow is the most commonly injured site, with ulnar collateral ligament (UCL) reconstruction (aka Tommy John surgery) being the most common procedure, followed by labrum repairs of the shoulder.<sup>6,7</sup> Across all ranks of professional baseball, it is estimated that overall UCL reconstruction prevalence is roughly 10% in active players, with an increased percentage in Major League Baseball (MLB) pitchers (25%) compared to minor league pitchers (15%).<sup>8</sup>

UCL reconstruction has shown to have very favorable outcomes in terms of recovery, as MLB pitchers are able to return to play (RTP) in the MLB at a rate of 83%, or a combined rate of 97.2% when also including the minor leagues.<sup>7</sup> Surgeries in the shoulder do not seem to be as successful. Outcomes in baseball players returning to throw after undergoing arthroscopic repair of a superior labrum anterior-posterior (SLAP) tear seems to vary within the literature ranging between 68-84%.<sup>9,10,11</sup> Research tracking RTP rates after SLAP tears in professional players also varies between 32%<sup>12</sup> to 40%, where the RTP criteria not only required athletes reach the pre-injury competitive level, but also return to the statistical quality of performance pre-injury.<sup>13</sup> In a review of shoulder surgeries in professional and collegiate players, Harris et al. noted only 68% of pitchers were able to resume pitching at their pre-injury level of competition.<sup>14</sup> The discrepancy in shoulder and elbow RTP rates post surgery may be due to minor changes in accuracy, velocity, or endurance that perhaps occur more often with the shoulder compared to the elbow. These differences can therefore affect the success of a player's career, which may be undetectable by physical examination of the shoulder and elbow, clinical outcome scores, or imaging studies.<sup>7,13</sup>

In terms of athletes' risk of sustaining another injury upon RTP, several authors have examined the association of past injuries with future injuries. Knowles et al noted that among high school athletes, the biggest predictor for injury was a previous injury.<sup>15</sup> Relationships between previous and future injury may be explained by residual deficits following initial injury. Upper extremity re-injury research is somewhat limited but several studies have investigated lower extremity re-injury risk factors. Previous research in lower extremity injuries requiring surgery, such as anterior cruciate ligament reconstruction (ACLR) have shown residual deficits in neuromuscular factors such as proprioception, peak torque, intra-muscular forces, altered gait mechanics, and functional movement patterns following injury.<sup>16,17</sup> It has also been demonstrated that changes in neuroplasticity and brain activation occur during knee flexion and extension tasks in athletes after ACL surgery, potentially increasing the risk of recurrent ACL tears.<sup>18,19</sup> Secondary injury rates in ACLR athletes have been shown to occur in 6-13% of reconstructed knees, and 2-6% sustain an ACL injury to the opposite leg.<sup>20</sup>

In baseball players experiencing rotator cuff-related pathologies, alterations in scapular orientation can occur during normal movements, such as increased elevation of the shoulder complex during elevation in the scapular plane, potentially increasing risk of future shoulder injuries.<sup>21</sup> Therefore it would not be unlikely for injured athletes requiring surgery to experience similar alterations in shoulder kinematics. Previous authors have also shown that collegiate athletes who experienced past injuries or shoulder surgeries demonstrated worse overall performance in composite FMS™ scores, and specifically lower shoulder mobility scores, although baseball players were not included in that particular study.<sup>22</sup>

Performing movement-based assessments as part of a pre-participation screening protocol can help identify individualized movement dysfunctions.<sup>23</sup> The Functional Movement Screen™ (FMS™) and Selective Functional Movement Assessment (SFMA) specifically, may help identify any asymmetries, imbalances or musculoskeletal dysfunctions that exist in the upper extremity of baseball players. Sports medicine professionals commonly use these

screens to quickly and accurately assess quantity and quality of movement, and these screens have high inter- and intra-rater reliability when administered by individuals experienced with the assessments.<sup>24,25</sup> Identifying individuals with residual movement dysfunction following surgery may help health care professionals identify baseball players who may be at a greater risk of re-injury in their throwing arms. However, to date there are no studies assessing relationships between FMS™ and SFMA upper extremity screens and history of elbow or shoulder surgeries in collegiate baseball players.

The purpose of this study was to assess relationships between history of shoulder or elbow surgeries and FMS™ shoulder mobility scores or SFMA upper extremity patterns in collegiate baseball players. It was hypothesized that players with a previous history of shoulder or elbow surgeries would have poor FMS™ and SFMA scores when compared to individuals with no prior history of shoulder or elbow surgeries.

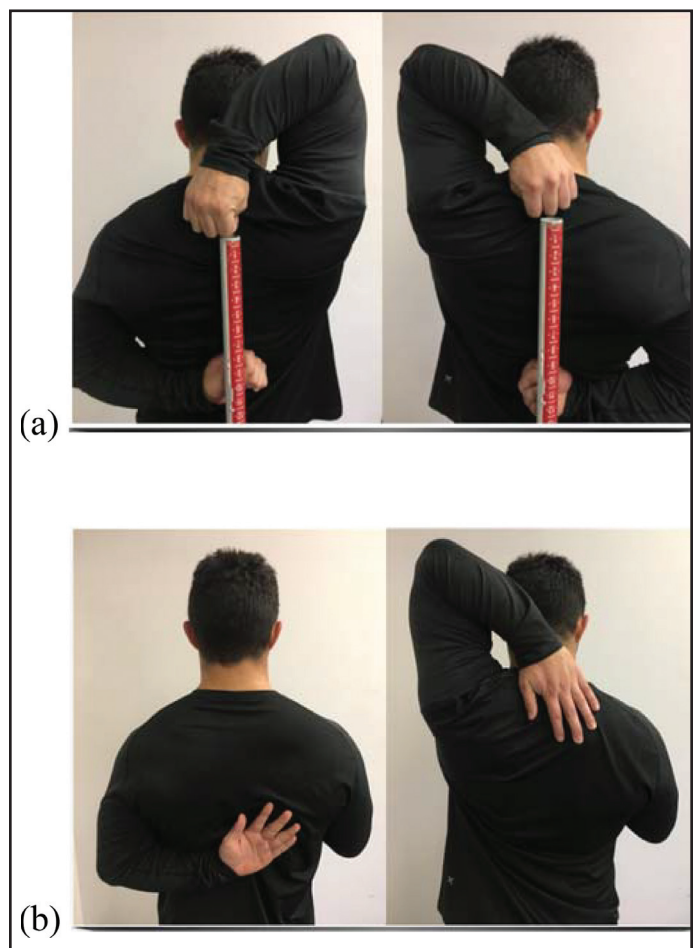
## METHODS

### Participants

National Collegiate Athletic Association Division III male collegiate baseball players ( $n=176$ , age =  $19.65 \pm 1.52$  years) were recruited from four local universities to participate in this study. Among those recruited were 37 seniors, 33 juniors, 48 sophomores, and 58 freshmen. Participants were included if they had been cleared to fully participate in team activities by a medical practitioner by the date of testing each year. Participants were excluded if they were being treated for a shoulder or elbow injury, or reported any current upper extremity injuries at the time of testing. A university institutional review board approved this study and written informed consent was obtained from all participants before beginning the study.

### Data Collection

Testing was completed before the start of official team practices during the spring season. The examiner for all data collection was a certified FMS™ and SFMA practitioner, with over five years of experience screening individuals. Intra-rater reliability during pilot testing demonstrated excellent agreement on both the FMS™ shoulder mobility (100%),



**Figure 1.** The different movement screens utilized (a) FMS™ shoulder mobility reciprocal pattern of both arms (b) SFMA upper extremity patterns 1 (left) and 2 (right). Both SFMA patterns 1 and 2 were repeated on the opposite arm as well.

and SFMA upper extremity patterns (92.5%). All participants completed a questionnaire regarding position, eligibility, surgical history of their shoulder or elbow, and history of time-loss (games and practice) due to a shoulder or elbow injury within the previous two years. All participants were individually screened in both the FMS™ shoulder mobility, and upper extremity patterns of the SFMA in randomized order, along with the clearing tests for rotator cuff impingement and acromioclavicular (AC) joint impingement as described by Cook et al<sup>26</sup> (Figure 1). Total FMS™ scores were dichotomized into “good” and “poor” groups (good = 2 or 3, poor = 0 or 1). SFMA scores were dichotomized into “good” and “poor” (good = functional non-painful [FN], poor = dysfunctional painful [DP], dysfunctional non-painful [DN], and functional painful [FP]).

## Statistical Analysis

Data analyses were conducted using the Statistical Package for the Social Sciences version 23.0 (SPSS, Inc., Chicago, IL). Initial chi-square analyses were performed to assess relationships between history of shoulder or elbow surgeries and FMS™ or SFMA performance category. Logistic regression analyses were used to assess relationships between history of shoulder or elbow surgeries and FMS™ or SFMA performance category while controlling for effects of grade and position. Statistical significance was determined *a priori* at  $p < 0.05$ . According to power analyses, 88 subjects were needed for chi-square analyses to identify a moderate effect size of 0.30 at an alpha level of 0.05 and an achieved power of 0.80. For logistic regression analyses, 113 subjects were needed to achieve an odds ratio of 2.0 at an alpha level of 0.05 and an achieved power of 0.80.

## RESULTS

Distribution of the 176 participants by position were: pitchers ( $n = 72$ , 40.91%), catchers ( $n = 17$ , 9.66%), middle infielders ( $n = 36$ , 20.45%), corner infielders ( $n = 28$ , 15.91%), and outfielders ( $n = 23$ , 13.07%). History of previous elbow or shoulder surgery was reported by 30 (17.05%) participants. Of the dichotomized FMS™ scores, 57 (32.39%) were classified as poor performers and 119 (67.61%) were classified as good performers. Of the dichotomized SFMA scores, 125 (71.02%) were classified as poor performers and 51 (28.97%) were classified as good performers. Distribution of FMS™ and SFMA scores by history of surgery category are presented in Table 1. Results

from chi-square and logistic regression analyses are presented in Table 2. History of elbow or shoulder injuries was not related to FMS™ or SFMA performance with or without controlling for grade and position ( $p$ -value range: 0.52 – 0.59).

## DISCUSSION

The primary finding of this research was that baseball players with a history of shoulder or elbow surgeries performed no differently on the FMS™ shoulder mobility screen or the SFMA upper extremity patterns compared to uninjured players; regardless of grade or position. These findings suggest that upper extremity movement screens may not differentiate players with a history of shoulder or elbow surgery from those with no history of surgery. Although no measures of rehabilitative outcomes were assessed in this study, the lack of significant findings could be due to improved rehabilitation strategies among practitioners. A growing trend in rehabilitation is to avoid focusing on single pathological structures of injured sites, which often results in poor patient outcomes. Rehabilitation has focused on expanding the identification and screening of other influencing regions above and below the area of primary complaint or dysfunction.<sup>27,28</sup> Another possible explanation for the lack of significant findings could be that the surgeries did not occur close enough to the time of testing to show any residual deficits, as the surgery date for each individual was not collected. The findings of this study differs from that of Chimera et al.<sup>22</sup> who observed worse FMS™ performance in a variety of Division I collegiate athletes with prior

**Table 1.** Counts of FMS™ and SFMA scores by history of surgery.

	Previous Surgery	No Previous Surgery	Total
<b>FMS™ Performance<sup>a</sup></b>			
Poor (score of 0 or 1)	9 (15.79%)	48 (84.21%)	57 (100%)
Good (score of 2 or 3)	21 (17.65%)	98 (82.35%)	119 (100%)
<b>SFMA Performance<sup>a</sup></b>			
Poor (FP, DN, DP)	21 (16.80%)	104 (83.20%)	125 (100%)
Good (FN)	9 (17.65%)	42 (82.35%)	51 (100%)
Note: FMS™ = Functional Movement Screen™ shoulder mobility scores; SFMA = Selective Functional Movement Assessment of dominant arm only; FP= functional painful; DN= dysfunctional non-painful; DP= dysfunctional painful; FN= functional non-painful.			
<sup>a</sup> Values are counts (%)			

**Table 2.** Relationship between history of surgery and FMS™ or SFMA performance categories.

	Unadjusted <sup>b</sup>		Adjusted <sup>c</sup>	
	Odds Ratio (95%CI)	p-value	Odds Ratio (95%CI)	p-value
<b>FMS™ Performance<sup>a</sup></b>				
Poor (score of 0 or 1)	0.87 (0.37, 2.05)	0.76	0.74 (0.30, 1.82)	0.52
Good (score of 2 or 3)	--	--	--	--
<b>SFMA Performance<sup>a</sup></b>				
Poor (FP, DN, DP)	0.94 (0.40, 2.23)	0.89	0.93 (0.38, 2.27)	0.88
Good (FN)	--	--	--	--
Note: CI = Confidence Interval; FMS = Functional Movement Screen; SFMA = Selective Functional Movement Assessment; FP= functional painful; DN= dysfunctional non-painful; DP= dysfunctional painful; FN= functional non-painful.				
<sup>a</sup> Good performance is reference group				
<sup>b</sup> Unadjusted OR and p-value calculated from 2x2 contingency table				
<sup>c</sup> Adjusted OR calculated from binomial logistic regression				

shoulder surgeries and injuries, however none of those athletes in the Chimera study were baseball players, which may explain these differences in performance.

In the sample of 176 collegiate baseball players, 119 were considered good performers in the FMS™, while only 51 were considered good performers in the SFMA. Upon observation of the players during testing, there were only 20 players who scored poorly in the SFMA pattern two movement of their dominant arms, while 105 scored poorly in pattern one. Pattern two includes shoulder flexion, abduction, and external rotation as the subject reaches overhead (and behind the head) toward the opposite scapula. Therefore, the majority of players classified as dysfunctional by the SFMA standards were classified so because of their pattern one performance, which is an inability to reach behind their back through shoulder extension, adduction, and internal rotation of the glenohumeral joint to touch the inferior angle of the opposite scapula. Poor pattern one performance may be partially explained by sport-specific adaptations that often occur in the dominant shoulders of baseball players, specifically glenohumeral internal rotation deficits (GIRD). GIRD is characterized by the loss of internal rotation of the glenohumeral joint, accompanied by an increase in external rotation<sup>29,30,31,32</sup> and is likely a result of soft-tissue adaptations and osseous changes

in anatomy due to the chronic repetitive stress of throwing.<sup>33</sup> The amount of shoulder abduction and external rotation demonstrated during throwing can alter soft tissues such as ligaments and capsular structures within the shoulder, causing a laxity or weakness in the anterior shoulder capsule, and tightening of the posterior shoulder capsule.<sup>33</sup>

The numbers of good SFMA scores were drastically different from the number of good FMS™ scores, which may be explained by differences in scoring criteria. The margin for asymmetry to exist within each arm while still receiving a good FMS™ score is greater since the arms are tested reciprocally (together) rather than separately. If an individual reaches their top arm overhead relatively farther than the bottom arm can reach behind their back, a player could still receive a good score even though they lack the motion necessary for a good SFMA score. An inability to reach the opposite scapula in the SFMA may be a better mobility threshold that is more sensitive to discrepancies in global movement.

In collegiate baseball players, sport-specific adaptations may be too great in the dominant-arm range of motion to discern between players with or without a history of shoulder or elbow surgeries. These screens do provide a quick and accurate identification of individuals with limited or painful mobility, which has been shown to increase the likelihood of

overuse symptoms throughout a collegiate baseball season.<sup>34</sup>

This study does have limitations when interpreting the data. The sample included was a convenience sample of four colleges, with data collection over a two-year period. Surgery dates were not collected, which could have factored into the lack of significant findings. Strength and conditioning practices were not investigated in terms of common exercises, or lack thereof which could play an important part in contributing to muscle imbalances in the upper extremity. Pitch counts, throwing velocity, and throwing volumes encountered in the previous season were also not recorded, which have all been associated as risk factors for shoulder and elbow injuries<sup>6</sup> and therefore not taken into account when assessing the relationship between movement screen performance and past shoulder or elbow surgeries.

## CONCLUSIONS

This study attempted to identify relationships between previous shoulder or elbow surgeries with FMS™ and SFMA performance in collegiate baseball players. There were no statistically significant relationships between history of surgery and FMS™ or SFMA performance. Implementing the FMS™ shoulder mobility and SFMA upper extremity patterns into pre-participation baseball movement screens may be beneficial for identifying individuals who exhibit movement dysfunctions, but those screens may not distinguish individuals with a previous history of shoulder or elbow surgeries.

## REFERENCES

1. Dillman CJ, Fleisig GS, Andrews JR. Biomechanics of pitching with emphasis upon shoulder kinematics. *J Orthop Sports Phys Ther.* 1993;18(2): 402-408.
2. Byram I, Bushnell B, Dugger K, et al. Preseason shoulder strength measurements in professional baseball pitchers: Identifying players at risk for injury. *Am J Sports Med.* 2010;38(7): 1375-1382.
3. Fleisig G, Andrews J, Dillman C, et al. Kinetics of baseball pitching with implications about injury mechanisms. *Am J Sports Med.* 1995;23(2): 233-239.
4. Vogelpohl RE, Kollock RO. Isokinetic rotator cuff functional ratios and the development of shoulder injury in collegiate baseball pitchers. *Intl J Ath Ther & Train.* 2015;20(3): 46-52.
5. Krajnik S, Fogarty K, Yard E, et al. Shoulder injuries in US high school baseball and softball athletes, 2005-2008. *Pediatrics.* 2010;125(3): 497-501.
6. Olsen II SJ, Fleisig GS, Dun S, et al. Risk factors for shoulder and elbow injuries in adolescent baseball pitchers. *Am J Sports Med.* 2006;34(6): 905-912.
7. Erickson B, Gupta A, Romeo A, et al. Rate of return to pitching and performance after Tommy John surgery in Major League Baseball pitchers. *Am J Sports Med.* 2014;42(3): 536-543.
8. Conte S, Fleisig G, ElAttrache N, et al. Prevalence of ulnar collateral ligament surgery in professional baseball players. *Am J Sports Med.* 2015;43(7): 1764-1769.
9. Seroyer S, Tejwani S, Bradley J. Arthroscopic capsulolabral reconstruction of the type VIII superior labrum anterior posterior lesion: mean 2-year follow-up on 13 shoulders. *Am J Sports Med.* 2007;35(9): 1477-1483.
10. Ide J, Maeda S, Takagi K. Sports activity after arthroscopic superior labral repair using suture anchors in overhead-throwing athletes. *Am J Sports Med.* 2005;33(4): 507-514.
11. Burkhart S, Morgan C, Burkhart S, Morgan C. SLAP lesions in the overhead athlete. *Ortho Clinics N Am.* 2001;32(3): 431-441.
12. Cohen S, Sheridan S, Ciccotti M. Return to sports for professional baseball players after surgery of the shoulder or elbow. *Sports Health.* 2011;3(1): 105-111.
13. Fedoriw W, Ramkumar P, McCulloch P, Lintner D. Return to play after treatment of superior labral tears in professional baseball players. *Am J Sports Med.* 2014;42(5): 1155-1160.
14. Harris J, Frank J, Bach B, et al. Return to sport following shoulder surgery in the elite pitcher: a systematic review. *Sports Health.* 2013;5(4): 367-376.
15. Knowles S, Marshall S, Bowling J, et al. A prospective study of injury incidence among North Carolina high school athletes. *Am J Epidemiol.* 2006;164(12): 1209-1221.
16. Fulton J, Wright K, Kelly M, et al. Injury risk is altered by previous injury: A systematic review of the literature and presentation of causative neuromuscular factors. *Int J Sports Phys Ther.* 2014;9(5): 583-595.
17. Boyle MJ, Butler RJ, Queen RM. Functional movement competency and dynamic balance after anterior cruciate ligament reconstruction in adolescent patients. *J Ped Ortho.* 2016;36(1): 36-41.
18. Grooms D, Page S, Nichols-Larsen D, Chaudhari A, White S, Onate J. Neuroplasticity associated with anterior cruciate ligament reconstruction. *J Orthop Sports Phys Ther.* 2017;47(3): 180-189.

- 
19. Grooms D, Page S, Onate J. Brain activation for knee movement measured days before second anterior cruciate ligament injury: Neuroimaging in musculoskeletal medicine. *J Ath Train*. 2015;50(10): 1005-1010.
  20. Pujol N, Blanche M, Chablat P. The incidence of anterior cruciate ligament injuries among competitive alpine skiers: A 25-year investigation. *Am J Sports Med*. 2007;35(7): 1070-1074.
  21. Laudner KG, Myers JB, Pasquale MR, Bradley JP, Lephart SM. Scapular dysfunction in throwers with pathologic internal impingement. *J Orthop Sports Phys Ther*. 2006;36(7): 485-494.
  22. Chimera N, Smith C, Warren m. Injury history, sex, and performance on the Functional Movement Screen and Y Balance Test. *J Ath Train*. 2015;50(5): 475-485.
  23. Cook G, Burton L, Hoogenboom B. Pre-participation screening: the use of fundamental movements as an assessment of function - Part 2. *N Am J Sports Phys Ther*. 2006b;1(3): 132-139.
  24. Minick KI, Kiesel KB, Burton L, et al. Interrater reliability of the functional movement screen. *J Str Cond Res*, 2010;24(2): 479-486.
  25. Glaws K, Juneau C, Becker L, et al. Intra- and inter-rater reliability of the selective functional movement assessment (SFMA). *Int J Sports Phys Ther*. 2014;9(2): 195-207.
  26. Cook G, Burton L, Kiesel K, et al. *Movement. Functional Movement Systems: Screening, Assessment, and Corrective Strategies*. Aptos, CA: On Target Publications; 2010.
  27. Sueki DG, Cleland JA, Wainner RS. A regional interdependence model of musculoskeletal dysfunction: Research, mechanisms, and clinical implications. *J Man Manip Ther*. 2013;21(2): 90-102.
  28. Wainner RS, Whitman JM, Cleland JA, Flynn TW. Guest editorial. Regional interdependence: a musculoskeletal examination model whose time has come. *J Orthop Sports Phys Ther*. 2007;37(11): 658-660.
  29. Magnusson S, Gleim G, Nicholas J. Shoulder weakness in professional baseball pitchers. *Med Sci Sports Exerc*. 1994;26(1): 5-9.
  30. Escamilla RF, Andrews JR. Shoulder muscle recruitment patterns and related biomechanics during upper extremity sports. *Sports Med*. 2009;39(7), 569-590.
  31. Crockett H, Gross L, Wilk K, et al. Osseous adaptation and range of motion at the glenohumeral joint in professional baseball pitchers. *Am J Sports Med*, 2002;30(1): 20-26.
  32. Park S, Loebenberg M, Rokito A, et al. The shoulder in baseball pitching. Biomechanics and related injuries. Part 1. *Bulletin NYU Hosp Jt Dis*. 2002;61(1/2): 68-79.
  33. Myers JB, Laudner KG, Pasquale MR, et al. Glenohumeral range of motion deficits and posterior shoulder tightness in throwers with pathologic internal impingement. *Am J Sports Med*. 2006;34 (3): 385-391.
  34. Busch A, Clifton D, Onate J, Ramsey V, Cromartie F. Relationship of preseason movement screens with overuse symptoms in collegiate baseball players. *Int J Sports Phys Ther*. 2017;12(6): 960-966.